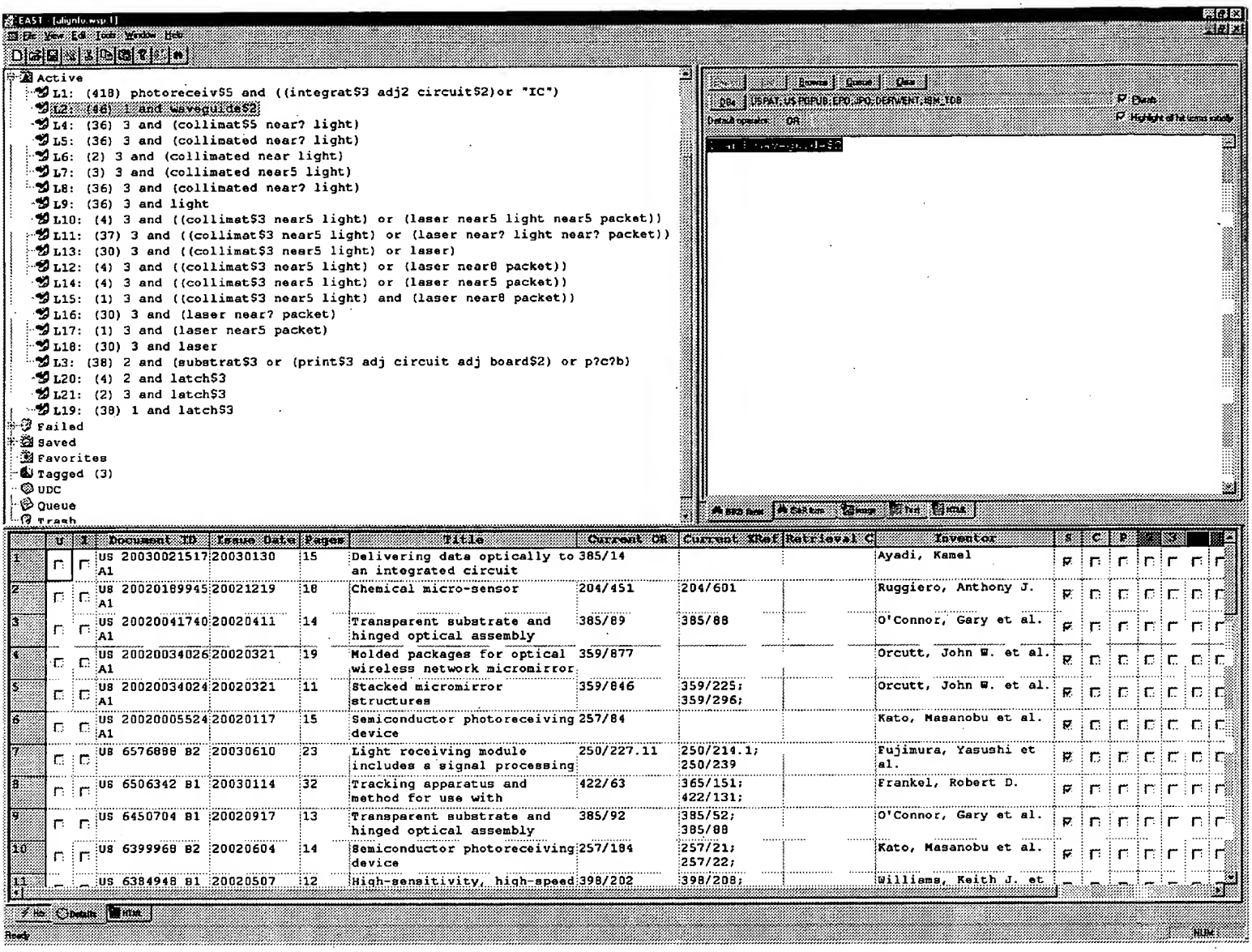

	U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Retrieval C	Inventor	S	C	P
1			US 20030021517 A1	20030130	15	Delivering data optically to an integrated circuit	385/14			Ayadi, Kamel			
2			US 20020189945 A1	20021219	18	Chemical micro-sensor	204/451	204/601		Ruggiero, Anthony J.			
3			US 20020041740 A1	20020411	14	Transparent substrate and hinged optical assembly	385/89	385/88		O'Connor, Gary et al.			
4			US 20020034026 A1	20020321	19	Molded packages for optical wireless network micromirror	359/877			Orcutt, John W. et al.			
5			US 20020034024 A1	20020321	11	Stacked micromirror structures	359/846	359/225; 359/296;		Orcutt, John W. et al.			
6			US 20020005524 A1	20020117	15	Semiconductor photoreceiving device	257/84			Kato, Masanobu et al.			
7			US 6576888 B2	20030610	23	Light receiving module includes a signal processing	250/227.11	250/214.1; 250/239		Fujimura, Yasushi et al.			
8			US 6506342 B1	20030114	32	Tracking apparatus and method for use with	422/63	365/151; 422/131;		Frankel, Robert D.			
9			US 6450704 B1	20020917	13	Transparent substrate and hinged optical assembly	385/92	385/52; 385/88		O'Connor, Gary et al.			
10			US 6399968 B2	20020604	14	Semiconductor photoreceiving device	257/184	257/21; 257/22;		Kato, Masanobu et al.			
11			US 6384948 B1	20020507	12	High-sensitivity, high-speed	398/202	398/208;		Williams, Keith J. et			

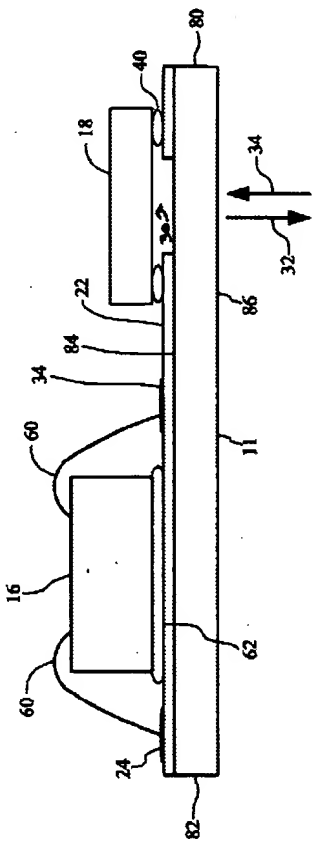

FIG. 3

ABSTRACT:

A method and apparatus are provided for providing an electro-optic signal processing device. The method includes the steps of providing an optically transparent substrate having first and second planar elements with an abutting common edge, the planar elements lying at differing angles with respect to each other about the common edge and a plurality of alignment apertures formed in the substrate. A plurality of optical devices of an optical array are disposed on the first planar element of the substrate, with transmission paths of the optical devices passing directly through the substrate. A signal processor is also disposed on the first planar element of the substrate. An optical fiber holder comprising a plurality of respective optical fibers and guide pin apertures disposed on a first surface of the optical fiber holder is aligned to the optical array using the guide pins and guide pin apertures. Optical signals of the optical devices of the optical array are coupled to respective optical fibers of the aligned optical fiber holder. A printed circuit board having a first surface is attached to a mating surface of the substrate's second planar element.

20 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 8

BRIEF SUMMARY:

(1) FIELD OF THE INVENTION

(2) This invention relates, in general, to fabrication of optical devices and, more particularly, to interconnecting optical devices and optical fibers.

(3) BACKGROUND OF THE INVENTION

(4) The coupling of an optical device or array of optical devices, an optical fiber or array of optical fibers, and an interconnecting substrate can be a difficult task. Usually the coupling is done manually or semi manually and can incur several problems such as being complex, inefficient, and not suitable for high volume manufacturing.

(5) In order to reduce electrical parasitics, short electronic interconnects are needed between semiconductor photonic devices such as lasers and photodiodes and electronic interface circuitry. This electronic circuitry may include photonic signal drivers and photonic signal receivers. The need for decreased distance between photonic devices and electrical interface circuitry increases as the signaling data rate increases. Photonic components are often placed on simple carrier substrates to verify operation, to do bum-in, or simply to facilitate handling of that device. This photonic device and carrier substrate are then placed on another substrate and additional packaging is completed. This packaging adds additional electrical interfaces, such as wire bonds and long non-controlled impedance wires, decreasing the electrical performance of the photonic device.

(6) In order to reduce optical losses and parasitics, efficient coupling of optical signals is needed. As optical signals tend to diverge from their

	U	I	Document ID	Issue Date	Pages	Title	C
9	☐	☐	US 6506342 B1	20030114	32	Tracking apparatus and method for use with	422
[illegible]	☐	☐	US [illegible] B1	[illegible]	[illegible]	Transparent substrate and hinged optical assembly	[illegible]
10	☐	☐	US 6399968 B2	20020604	14	Semiconductor photoreceiving device	257

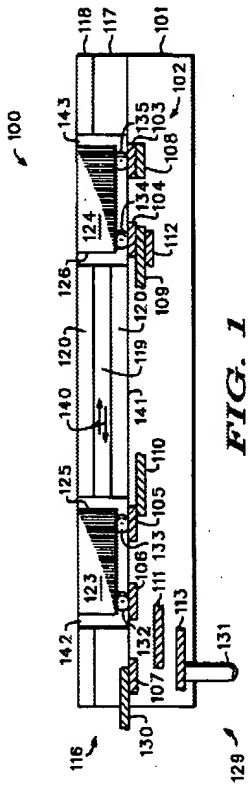

FIG. 1

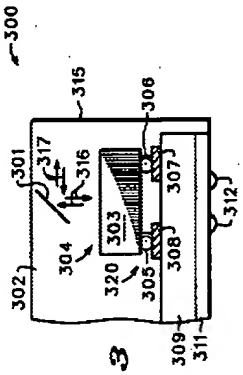

FIG. 3

a photonic device are operably coupled to an interconnect substrate. A molded optical portion having a core region with a first end and a cladding region is positioned with the first end of the core region being adjacent to the optical surface of the integrated circuit to operably couple the first end of the core region to the optical surface of the integrated circuit .

25 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 4

BRIEF SUMMARY:

(1) BACKGROUND OF THE INVENTION

(2) This invention, relates in general, to optoelectronic devices and, more particularly, to molded waveguides .

(3) As the amount of information, as well as the speed of transferring information between electronic components increases, optoelectronic techniques or methods used for this transfer become more important. For example, in some high speed computers, optoelectronic techniques are used for clock distribution, thereby enabling standard electronic components to be timed correctly so as to manage the transfer of information more efficiently. However, at present, use of optoelectronic techniques has several major drawbacks or problems, such as being complex, inefficient, costly, and generally not suitable for high volume manufacturing. Thus, as the amount of information and the speed at which this information needs to be transferred, a need for a structure and a fabrication method that allows for efficient and cost effective manufacturing, as well as use of optoelectronic methods and optoelectronic devices will be required.

(4) Conventionally, waveguides are manufactured by a combination of photolithographic and etching processes. For example, a conventional waveguide is fabricated by applying a suitable optical material onto an interconnect substrate, such as a printed board. A photoresist material is then applied onto the optical material and subsequently patterned by a photolithographic process. The pattern defined by the photolithographic process is subsequently transferred into the optical material by an etching process that removes exposed portions that are not covered by the photoresist material. The circuit board with the etched pattern is subsequently cleaned, which removes the residual photoresist material and leaves a resultant optical layer in place on the circuit board. As described above, conventional fabrication of optical layers used for waveguides using this sequence of events is not only complicated and expensive, but also does not lend themselves to high volume manufacturing.

(5) It can be readily seen that conventional methods for manufacturing waveguides have severe limitations. Also, it is evident that conventional processes that are used to fabricate waveguides are not only complex and expensive but also not amenable to high volume manufacturing. Therefore, a method and a structure that lends itself for making waveguides and integrating these waveguides into a circuit board is highly desirable.

	T	S	Document ID	Issue Date	Pages	Title	C
31			US 5513288 A	19960430	14	Optical polymer element for coupling photoelements onto	385
32			US 5511138 A	19960423	8	Interlocking waveguide and method of making	385